Decision theoretic troubleshooting applied to the tail biting problem in pigs

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Abstract

Tail biting in growing pigs is a behavioural problem which is widespread and causes major welfare problems and economic loss. Estimates of prevalence range from under 1% to over 10% at the national level, but individual farms may have figures as high as 20%. The causal mechanisms leading to tail biting is not very well understood, even though the number of proposed mechanisms are very large, both in the scientific literature and between experts in the advisory sector.

From a decision theoretic point of view the problem may be viewed as an example of troubleshooting. Within recent years expert system based on Bayesian Network methodology has been applied to trouble shooting mainly in industrial domains e.g. for computer printers. I.e. if a component in a printer has a failure, the expert system will help the computer user to identify the component that has the failure. Similarly, the tail biting problem may be thought of as a component in the farm housing and management that is in error. An expert system may therefore be used to guide the farmer/advisor through a series of questions concerning e.g. management, feeding, housing and behaviour of pigs in order to elucidate the cause of the tail biting in the specific herd.

The paper will present preliminary results from an ongoing Danish study which aim at the construction of such an expert system for troubleshooting build as a Bayesian Network. Because of the use of Bayesian network the system will be able to handle differences in precision in expert knowledge, updating of model parameters based on observations in problem herds. The focus of the presentation will be on the discussion of the special issues in the problem domain seen from a decision theoretic point of view, the elicitation and representation of expert knowledge, methods for learning model parameters and data acquisition.